that put another front $\frac{1}{25}$ immersion, would it not be preposterous to call the performance of the immersion front that of a $\frac{1}{10}$? His practice is to give two names; and as the originator of the plan of two fronts, he may have the right to fix the rule of nomenclature. — C. S.

CORRECTIONS TO PROF. TUTTLE'S PAPER IN MAY NATURALIST. In all the figures save the first, the secondary flagellum is represented as arising a short distance from the base of the first, instead of from the same point with it, which is what I *meant* to indicate in the drawings. The name of the genus which should have been *Uvella* is given as "Urella." The specific name near the bottom of page 286 should be *glaucoma*. — A. H. T.

NOTES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE: — We understand that the Committee having the next meeting in charge are unable to make any announcement of arrangements until they hear from the Local Committee in San Francisco.

NATURAL HISTORY EDUCATION AT HARVARD UNIVERSITY: — The changes which have been made in the departments of Natural History at Cambridge within the last two years have been very great, greater perhaps than in any other school within the same time. As there are many persons of both sexes who are seeking opportunities for study such as the University now offers, we give a sketch of the plans of education in the different schools as far as they concern the student of natural history. There are five schools in the University where natural history is taught; the College, the Museum of Comparative Zoology, the Botanic Garden, the Scientific School and the Bussey Institution. Let us trace in a general way the course of a student in these departments.

The student who enters the college to-day is no longer compelled to follow the one uniform road over which the boy of twenty years past had to go; after his first or freshman year he may begin to turn himself into the paths of natural science. At the commencement of his second year he may begin his studies by courses which lay the foundations of a knowledge of chemistry, taught in the Laboratory, of Physical Geography, Geology and Meteorology taught by text-books, lectures and excursions in the field. The time allowed for these studies during this year, is es-

timated at twelve hours per week. It is expected that the student will, in this year, lay the foundations for the work he may wish to do during the following years, by getting that general idea of the physics of the globe, which forms the necessary basis for the work of the naturalist in any department of labor.

With the junior year the studies of a strictly biological character begin. One course includes the elements of comparative zoology, with elementary teaching in microscopy, another the elements of botany, a third the elements of comparative anatomy. The principle on which the teaching of zoology is based is that the student should at the very beginning be put into the position of an investigator. With this object in view the student is at first required to do all his work upon natural objects. Beginning with the solid part of a *Fungia*, or some other object of equal simplicity, the student is then required to draw and describe the specimen, aided only by such questions and suggestions as may be necessary to get him over the worst obstacles; as soon as he has done the little he can do in the way of close observation, he is given a Manacena or Agaricea which he proceeds to compare with the Fungia, and so making at least diagrammatic drawings with a dozen other specimens of Polyps, Halcynoid and Actinoid. Thus the student gets some idea of the general relations which exist among the members of that group; when, say, in thirty hours of labor he has got through this work, a few lectures serve to supplement and connect the knowledge he has obtained from the personal study of the dry parts, illustrated by a sufficient series of alcoholic preparations, and helped out by such individual teaching as can be given without weakening the habit of self-reliance. In this way he goes through group after group, until, from a study of about one hundred species, he has gotten a general idea of the organic forms above the Protozoa. In this stage of the student's work, care is taken to avoid the use of diagrams, this avoidance being dictated by the conviction that the student remembers the diagram and not the object. During this year botany is also taught with the same object and by much the same method. In connection with the zoological instruction, the students are taught the elements of microscopy, the development of the subject being left to the next year.

The second year courses are advanced zoology, palæontology, historical geology, geography and advanced botany. The first two

have one common feature; three lectures or readings are given each week to the discussion of the history of zoology and palæontology, with special reference to modern opinions concerning the relations of animals. An effort is made to acquaint the students with the character of the greater works in the science, by giving them constant opportunities for consulting them in their studies and by showing them the methods of the masters in the several departments. Besides this each student is required to pursue some special line of work. In the choice of subject the largest liberty is allowed, but the student is, however, recommended during a half year to study advanced microscopy; in this work the aid of an instructor is given for four hours a week. In this four months he should acquire a sufficient knowledge of the practical management of the instrument in all ordinary investigations. The laboratory is well supplied with instruments of instruction in this branch of work.

Besides the course in the history of the science, the student who takes the elective in palæontology is required to traverse the ground covered in that part of "Dana's Manual" which is entitled historical geology, acquainting himself in a practical way with the most important characteristic fossils of the several periods.

The greatest value in this work is set upon the keeping of full and accurate note books in both the last described courses. The rank of the student turns upon the condition of his note books, as much as upon the quarterly examinations which he is required to pass.

Those students who desire to contend for honors at the graduation in zoology or in palæontology, are required to have taken besides their junior election in natural history, one election in physical science, and at least three natural history elections in the senior year, in all of which they must have attained excellence. They are, moreover, required to write an acceptable thesis which must contain an original discussion of some question in biological science. Hereafter the junior electives will consist of a course in anatomy and physiology, one in zoology and one in botany, and the students in this as well as in the last year will be allowed to substitute for the themes required in other branches, theses upon scientific subjects prepared under the direction of their instructor.

The natural history education of the scientific school has undergone a great change within a year; hitherto the students have

worked with the professors of the several departments, giving their whole time to any specialty which they might select. This plan admirably suited as it was to the needs of the trained student who had fitted himself in other schools for the work of a special department, was not adapted to the needs of those to whom this teaching was to fill the whole office of higher education. With the introduction of the doctor's degree into the plan of the school, it became necessary to make a change which has long been desirable by fixing a definite scheme of general scientific instruction in place of the imperfect system which had hitherto prevailed. A three years' course has been arranged which secures to the student a broad view over the whole field of science and the advantage which comes from a knowledge of the methods of research in use in its several branches. It gives to those persons who may not have the desire or the means to go through a regular college course, a systematic training which will occupy their full time for three years and give the best results of culture which can be attained in any scientific course. Students who can pass the required examinations are admitted to the degree of bachelor of science. Graduates of colleges where science is taught in an effective way should be able to enter this course in advanced standing. Students of the college, graduating with honors in the departments of natural history, should be able to obtain the degree in this course in a year of study. The student is trained in the important art of expressing himself clearly on the matters which he is studying, by requiring him to keep carefully planned note books, and he is urged to the preparation of theses which may embody the results of some research. Ample opportunities are given for the prosecution of studies in the field by excursions during term time and vacation led by the instructors in zoology, botany and geology.

After two years' further study, one of which must be spent in Cambridge, the student may apply for the degree of doctor of science, which is given after an examination conducted by a committee appointed by the Academic Council of the University.

The study done, the preparation for the degree must be in some special department when the student will generally become the private pupil of some one professor. The degree will be a certificate of capacity as an investigator or teacher in the science which the student has made his specialty.

The resources of the University for teaching science are, it is

believed, not only unrivalled in this country, but unsurpassed in Europe. The scientific departments have a list of twenty-four instructors, and the material resources which they afford have cost in the aggregate over a million and a half of dollars. There are six museums in the University: the Museum of Comparative Zoology, the Botanical Museum, the Museum of Comparative Anatomy, Museum of Morbid Anatomy, the Museum of Mineralogy and that of Ethnology. These collections are unsurpassed by those of any educational institution in this country, and taken together they furnish an efficient basis for the acquisition of the wide ranging knowledge on which a scientific career must be based. The opportunities for contact and intercourse in scientific societies are excellent. There is a working society of natural history in the University, and the Boston Society of Natural History, one of the largest and most efficient of the American institutions of this nature, is also open to all students of the science. — N. S. S.

The Hassler Expedition: — We arrived here the 11th of April and all well. We left Montevideo Feb. 28th, and after spending several days very profitably in Gulf Matias we steamed south with fair weather rounding Cape Virgin on the 13th of March and anchoring the first night after in the Straits of Magellan. Lateness in the season obliged us to put off the anticipated trip to Falkland Islands. We started from Possession Bay, our first anchorage, the day after, stopping at Elizabeth and Santa Magdalena Islands and arrived March 16th at Sandy Point, which is the only settled place on the Straits and contains a population of about one thousand. Leaving these on the 19th (Mar.) we steamed on, anchoring every night in some good harbor, passing Cape Froward, our most southern point, on the 20th and reaching the entrance to Smyth Channel on the 27th when we turned north and left the Straits of Magellan. Our trip through was a most interesting and charming one to us all, and many valuable geological observations were made by Prof. Agassiz. Our zoological collections were very satisfactory excepting the fishes which, owing to the steep rocky shores and abundance of kelp prevented our using to advantage our well fitted seines and we were not so successful as we anticipated; the short stay there also limited our collecting, but as a whole the time spent there was very pleasant and enabled us to reap much scientific information. The Straits

are bordered on either side by mountains one or two thousand feet high with their tops more or less covered with snow from which were flowing glaciers. I could count six extensive glaciers in sight above me at one time. In passing we had a favorable opportunity to examine the rocks for evidence of a once existing Glacial Period, corresponding to that seen in the north, and Prof. Agassiz made his observations with perfect satisfactory results. The mountains on both sides showed unmistakable evidence of a large glacial mass of ice once pushing its way south northwards. We stopped one afternoon at Glacier Bay to visit the grand glacier which is moving slowly down the valley from the snow on the mountains, the accumulations of winters, and from which the Bay receives its name. The glacier was at least four miles long, two hundred feet thick and one mile wide at the termination. The progress of the mass down the valley was ascertained to be three eighths of an inch per hour. All the necessary observations were carefully made by Prof. Agassiz. From the Sraits of Magellan we steamed inland up Smyth Channel and saw, for the first time, the Pacific at the outlet of Gulf of Pénas. Touching at two ports on Chiloe Island we went to Lota for coal and arrived here on the afternoon of the 11th inst. We shall remain here several weeks and there is a favorable prospect for our making a large collection of specimens. — J. Henry Blake. *U. S. C. S. Steamer, Talcahuana, Chili, April* 13, 1872.

We call attention to the card of Mr. Sanborn, the well known entomologist so long connected with the Massachusetts State Board of Agriculture and the Boston Society of Natural History. To one who has not had practical experience in the matter it will seem odd to be told that in order to receive an answer to inquiries relating to "bugs" that a fee must be enclosed just the same as if he was asking for information from a lawyer or a doctor, but when it is remembered that the inquiries not only often call for several hours of the valuable time of the person addressed, but, also, often involve great pecuniary interests, the matter is put in its true light. While every scientist is ready to give such aid as is in his power to students, out of pure love for his science and a desire to advance it, still there are constant demands on his time made by parties who have simply a pecuniary end in view, and for such to pay for their information is simply justice to the men who have by long and hard study become able to answer them.